



SAFFRON (*CROCUS SATIVUS* L.) - A WONDERFUL BUT THREATENED LEGACY OF KASHMIR

Joo G. N^{*1} and Syed Muzaffer Ahmad²

¹Department of (Botany) A S College, Srinagar Kashmir(J&K)

²Department of (Chemistry) A S College, Srinagar Kashmir (J&K)

ARTICLE INFO	ABSTRACT
Received 26 th March, 2016 Received in revised form 19 th April, 2016 Accepted 21 st May, 2016 Published online 28 th June, 2016	Saffron (<i>Crocus sativus</i> L.) a legendary crop of Kashmir, known all over the world for its panacea properties, is dying a slow death. Pampore in district Pulwama is famous worldwide for its saffron fields. As many as 16000 thousand families spread over 300 villages of the saffron belt of pampore cultivate it, not only a mere crop for a decent livelihood but a family legacy as well. A preview of cultivated area, production and productivity for the last decade and half shows that this golden crop is dwindling at a fast rate. It is quite unfortunate that this crop is nowadays under threat of losing its charm due to a created damaged atmosphere. Further the continued impassivity by saffron growers and various challenges may result in the loss of this delicacy. The present compilation besides, describing the cultivation of this golden crop, also attempts to visualise the biotic factors that are threatening its legacy.
Keywords: Biotic factors, Saffron (<i>Crocus sativus</i> L.), Challenges, Cultivation, Legacy, Production	
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INTRODUCTION

Kashmir saffron is a highly prized spice that has been part of its distinctive culinary history and a great gastronomic import to the rest of the world on account of its panacea properties. In Kashmir it is the legendary crop of the well-drained plateaus called *karewas* (locally wudars) of Pampore, where it has been grown since ancient times. Saffron derives its name from the Arabic word “Zaafaran” which means yellow that is the colour of paste of saffron. According to the official estimates, saffron is cultivated by more than 16,000 families, scattered over 300 villages of the saffron belt of Pampore, as a family profession, as it is not a mere crop but a legacy (Malik, H 2012). According to most accepted view Saffron is believed to have originated in Turkey, from where it was taken by Arab traders to Spain and Iran. From Iran the crop was brought to Kashmir region of India by Persian rulers through Central Asia (Silk route) around 500 B.C. The Persian rulers transplanted the Persian Saffron corms to the Kashmir soils, once they conquered Kashmir. Saffron finds its mention as far back as 1500 BC in many classical writings as well as in the Bible. The Kashmiri ancient Hindu epic, NilmatPurana also mentions about the Saffron cultivation in Kashmir. Pampore has been and continues to be the bowl of Saffron cultivation in Kashmir region.

TAXONOMY

Saffron (*Crocus sativus*) is a legendary crop acclimatized to hillsides, plateaus (locally called *karewas*) in altitudes between 1500 to 2400metres and is well adapted to areas with cold, rainy winters and warm dry summers. It is a perennial low

growing herb with globular stem ranging from 0.5 to 5.0 cm in diameter. The stem remains covered with dry hairy membranous scales, with small fibrous roots on the rear end. The corm produces 6 to 15 narrow needle shaped (acicular) dark green leaves about 10 cm long, surrounded in the rear end by 4 to 5 scales (Fig 1). The corm normally produces 1-4flowers depending upon its size (Joo and Sultan, 2013).



Figure 1 cultivation A whole saffron plant (left) and a flower (right). Note reddish and trifid stigmas which constitute the actual saffron taxonomy.

*✉ Corresponding author: Joo G. N

Department of (Botany) A S College, Srinagar Kashmir(J&K)

The flowers are enclosed in the lower region by 4 to 5 scales (cataphylls). The perianth comprises six gamophyllous tepals arranged in two whorls of three each, violet or reddish purple in colour. Androecium consists of three epitepalous stamens, filaments are short but anthers long and yellow in colour. Carpel bears elongated pale yellow exerted filiform style, divided at the top into brilliant orange red, trifid stigma, 25 to 30 mm in length. The trifid stigmas at the upper tip are 3 to 4 mm thick, funnel like, lustrous deep red in colour and curled. The stigmas usually hang out between the perianth lobes and along with style constitute the saffron of commerce.

CULTIVATION

Climate and soil

saffron thrives well in sub temperate climate at altitudes ranging from 1500m to 2400masl. Saffron requires a well-drained clay loam and ordinary dry garden soils. A medium grade light soil with neutral to alkaline reactions is suitable for its cultivation. The areas which receive a rainfall of 30 to 40 cm and are covered with snow during winter are suited for cultivation. Spring rains are favourable for promoting production of new corms while a second spell of rains at the end of summer or at the beginning of autumn encourages profuse flowering.

Land preparation and planting

Land preparation starts in early autumn (September). The field is ploughed 4 to 5 times to a depth of 30 to 35 cm. The land is thoroughly mixed with farm yard manure at the rate of 2 tonnes per hectare. Another ploughing is required at the time of sowing of seed or corms. Vertical furrows are prepared with a plough and corms are planted in the furrows at 8 - 10 cm depth, with an intervening distance of 6 - 10 cm and a spacing of 15 - 20 cm is maintained between adjacent rows. After planting the furrows are closed and the field is levelled by planking. The field is then laid out into 2.5 m square beds with 30cm wide and 15 cm deep drainage outlets all around. The size of the corm for planting has a marked influence on the flower production. As a rule smaller sized corms tend to show vegetative growth during 1st to 2nd year of planting, while corms with a circumference size of 20 - 30 cm produce flowers during the 1st year of planting (Joo and Sultan, 2013). The seed corms should be healthy and free from any fungal infection. The outer most fibrous covering of the seed corms is removed and are dipped in a solution of 5% copper sulphate as a prophylactic treatment before sowing. Flowers are being produced from almost 2nd week of October and continue up to first week of November, with shady places flowering first as flowering requires moderate warm conditions. The life cycle of saffron is similar everywhere but there are differences in the timing of different events (Botella *et al* 2002). Flowering occurs during autumn generally in the month of October followed by vegetative stage throughout winter and formation of replacement corms at the base of shoots. Large number of shoots per corm result in the formation of several small- sized replacement corms. In the months of April or May the leaves senesce and wither coinciding with a rise in temperature and corms go into dormancy. This long vegetative phase

(photosynthetic phase) is essential for the complete development of replacement corms. "The transition to reproductive stage occurs shortly afterwards in the apex or the buds of under ground corms." In kashmir this transition occurs during the month of July (Koul and Farooq 1984). Shortly afterwards from around mid-July the sheathing non—photosynthetic white leaves known as cataphylls start to grow at a faster rate than the shoot apex, piercing through the soil and protecting growth of young shoot and the scape. Long hot summer has been reported to delay flower emergence which occurs in the late autumn as the temperature falls to the range of 15—17°C (Molina *et al* 2005).

Harvesting and processing

The flowering season is confined to about three weeks time from mid October to first week of November. The flowers are picked manually on daily basis in the morning and stigmas along with styles are separated manually. About 75,000 flowers are required to produce a kilogram of good quality dried saffron. The separated stigmas along with the styles are sun dried to a moisture content of 8—10 per cent, stored in moisture proof containers. Average yield varies from 1.5 - 2 kg of dry saffron per hectare of land. Commercial grades generally recognised in trade are as follows:

- *MONGRA* (stigmatic portions only).
- *LACHA* (part of the stigma along with style).
- *GUCCHI* (whole stigmas with styles tied in bundles).

The bitter taste of saffron is due to picrocrocin, a colourless glycoside, Carotenoid pigments especially the bright orange yellow 'crocin' contributes to its colour. The aroma is accredited to the volatile oil 'safranil' formed during drying and storage, by the hydrolysis of the picrocrocin (Escribano, Alanso, Coca-Prados 1996).

A THREATENED LEGACY During the last two decades the total area under saffron cultivation has been reduced by 25% while the production and productivity also receded significantly. As per the data available from the State Financial Commissioner, Srinagar (J&K) the total area under saffron cultivation in the year 1997 was 5361 hectares, production was recorded at 17.37 metric tonnes and productivity was estimated at 3.24 Kg per hectare.

Table 1 "The production data during this period is depicted

Year	Area under cultivation (In hectares)	Production (In metric tonnes)	Productivity (Kg/hectare)
1997	5361	17.37	3.24
1998	4194	N A	N A
2002	2880	5.154	1.88
2003	2742	6.525	2.27
2004	3075	4.834	1.57
2005	2989	8.852	2.96
2006	2928	4.85	1.66
2007	2436	9.131	3.75
2008	3110	4.721	1.63
2009	3675	9.188	2.50

*("Table 1 Saffron productivity during the last decade (Reyaz Malik, 2009)." No survey was conducted during the period 1998 to 2001).

However in the year 2009 the total area under saffron was 3675 hectares, the production was 9.18 metric tonnes, while productivity was recorded at 2.50 kg per hectare (Economic

survey 2010--2011 J &K). Keeping 1997 as the bench mark, the percentage change during the aforesaid period reveals that area has receded to 31%, the production level reduced to 47% while the productivity has declined to about 23%. The production data during this period is depicted in the following table.1 In the year 2010—2011, the production was 11.5 metric tonnes and five years later in 2015—2016, production stands as 9.6 metric tonnes.

DISCUSSION

Due the continued decreasing trends in the yield and productivity of this golden crop, saffron growers are no longer motivated in investing their money and time in the industry when they fear that outcome would not match their hard toil in the fields. The continued urbanisation in the saffron fields has reduced the cultivated area as well. From 7000 hectares in Pampore tehsil the land under saffron cultivation has reduced to 3600 hectares, while few years before one hectare would yield around 10 kg of saffron, at present only around 2 kg per hectare are produced (Sheikh Jaleel, 2012). The ever increasing number of cement plants and lime stone mines coming up in Khanmoh-Khrew-Ladhu area, are adding tonnes of noxious pollutants to local atmosphere daily. The cement dust is changing the soil composition, chemistry, killing the crop and surely choking the saffron fields. A pall of gloom has descended over the whole area of saffron belt, the reason being the huge clouds of dust and smoke emitted by a dozen and odd cement factories and lime stone mines catering to these factories. The clouds that engulf the whole area have wreaked havoc with the saffron fields, what remains are barren, undug and undressed fields. Saffron soil is also being vandalised for land fills and massive road widening during broad day light without thinking of ecological consequences. People associated with saffron farming say that if the present state continues then the day is not far away when Kashmir will lose its heritage crop.

CONCLUSION

With a continued declining trends of saffron production and productivity, Saffron growers of the area are no longer interested in this legacy as it is difficult to incur the expenditure on digging and dressing of saffron fields. The cultivated areas in the vicinity of cement plants and lime stone mines have been transformed into barren lands. In order to save this legacy from any other kind of further damage in near future, Government should take every possible step to nurture the saffron industry by banning the sale and use of saffron land for any construction purposes. Further a complete ban on the establishment of any cement factory and lime stone mines in violation of Environment Protection Act needs to be discouraged and banned in the saffron belt. Although Government of India approved a flagship programme for revival of saffron through “National Saffron Mission” in the year 2011 to improve the overall production and productivity of saffron, but the apathy of the officialdom and indolence on the part of saffron growers damaged the purpose for which “National Saffron Mission” was introduced.

Keeping in view the significance of this cash crop which used to fetch crores as annual returns to the saffron growers, besides providing livelihood for thousands of people one way or the other, Kashmir saffron desperately needs a fresh lease of life. The research (SKAUST-K) conducted so far reveals a tremendous scope for rejuvenation of saffron thereby increasing production and productivity by threshold levels. The current scenario demands to gear up and strengthen the farmers oriented and technology driven research approach by Sher-i-Kashmir University of Agriculture Sciences and Technology Kashmir (SKUAST-K) and Central Institute of Tropical Horticulture (CITH) to save the prestigious heritage.

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